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(54) Unit for simulating a solid-fuel fire

(57) A gas fire includes a solid-fuel simulation unit (6). The unit comprises a cover (7) which is shaped to simulate coals and is provided with a number of apertures (8). A filament tube (9) is positioned diagonally within the unit, beneath the cover, so that the tube may be viewed directly through some of the apertures. A controller (11) causes different regions of light intensity to move between the discharge electrodes of the tube to simulate the appearance of flickering flames. Light pipes (10) may be provided to guide light from the fluorescent tube to other of the apertures and a back reflector (12) may be positioned behind the tube to direct light generally into the interior of the cover to simulate the glow of embers.

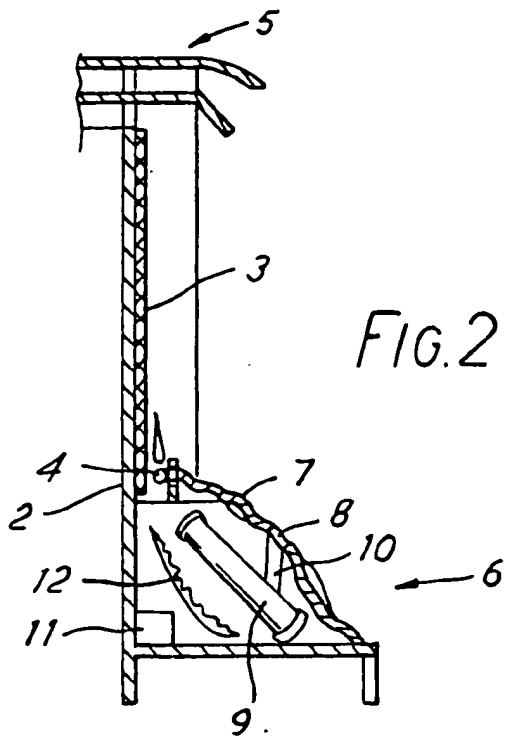

FIG. 2

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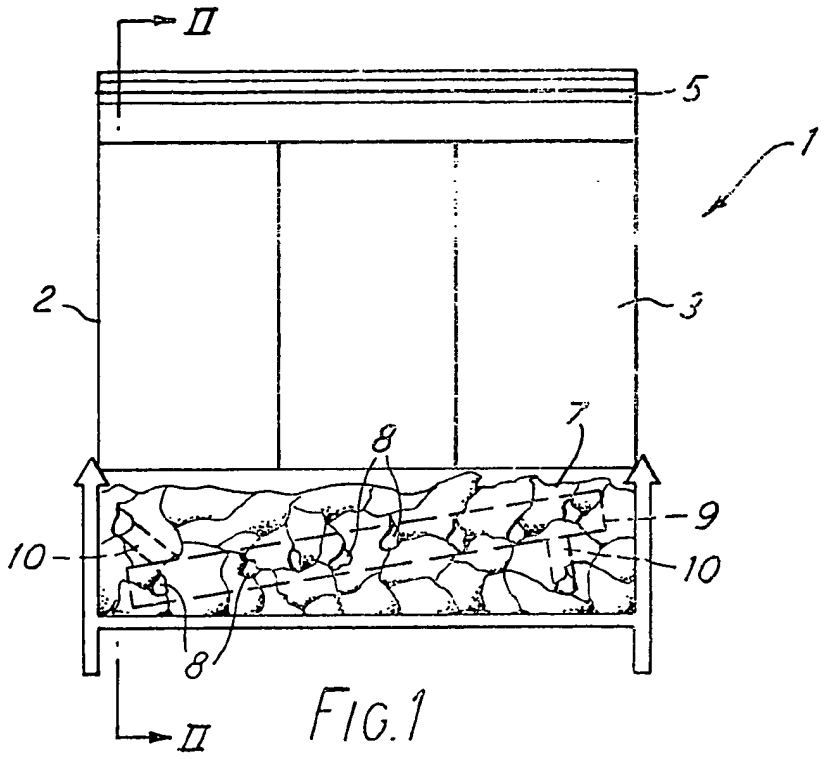

FIG.1

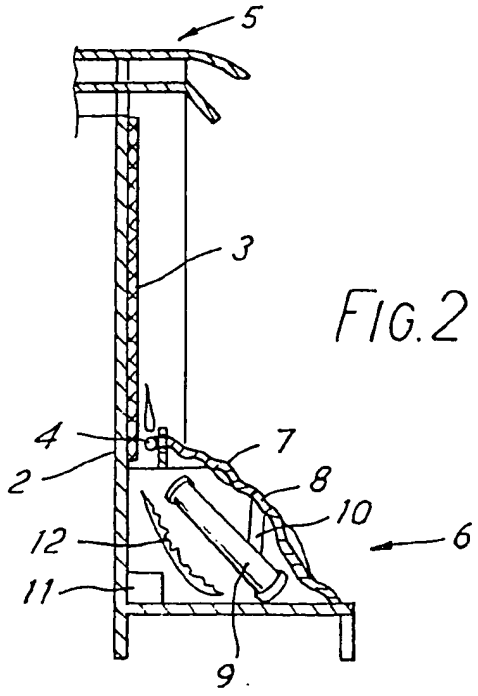

FIG.2

SPECIFICATION

Unit for simulating a solid-fuel fire

The present invention relates to a unit for simulating a solid-fuel fire, for use either with a heater or alone.

One form of conventional gas fire has a simulation unit with a fibre-glass cover shaped and coloured to represent a pile of coal or logs; under the cover there is at least one rotatable disc and filament lamp. Heat rising from the illuminated lamp causes the disc to rotate, whereupon its irregular edges and apertures cast changing patterns of shadows of light on the inner surface of the cover. Parts of the cover are coloured to transmit orange-yellow light to simulate glowing solid fuel. However the illusion is not very realistic or satisfactory, partially because of the regularity of the variation in illumination caused by the use of a rotating disc.

An object of the present invention is to provide a unit which has the realistic appearance of a solid-fuel fire.

Another object of the present invention is to provide a unit, for simulating a solid-fuel fire, which operates more efficiently and more economically than units of the described conventional gas fires.

Another object of the present invention is to provide a unit which has no moving mechanical parts.

The present invention provides a unit for simulating a solid-fuel fire, the unit comprising a gas discharge tube, means to create, in use, regions of different light intensity moving between the discharge electrodes of the tube a cover having one or more apertures through which a respective part or respective parts of the tube can be viewed.

In one form of the invention, the unit incorporates means to produce swirling regions of light intensity between the discharge electrodes; preferably the discharge tube has impurities within it to produce these swirling regions of light intensity. Additionally or alternatively the discharge tube has no effective gettering agents in it during operation. Thus this form of the invention utilizes the phenomenon of swirling which is sometimes observed for a short time when a conventional fluorescent tube is switched on for the first time.

Thus, when these swirling regions of light move along the tube, variations in light intensity are transmitted intermittently through the aperture or apertures in the cover, thereby providing the appearance of flickering flames. The swirling action ensures that the simulated flames appear to flicker randomly.

In another form of the invention, additional or alternative to the features of the previous form, the unit has means to effect striations of light intensity moving between the electrodes; such striations may be produced by passing through the discharge tube a current of a value below the minimum required for uniform gas discharge.

When such striations occur, bands of light pass along the discharge tube resulting also in flashes of light transmitted intermittently through apertures in the cover to give the appearance of flickering flames. The current supply may have means to vary continually the current input to the tube in order to enhance the randomness of the flames.

The tube may have an A.C. power supply and a conventional stabilizing ballast; alternatively it may have a D.C. power supply with a conventional resistive ballast.

Each of these forms can provide a more realistic simulation and a more pleasing and attractive appearance than those of the described conventional gas fire. Also by using a discharge lamp, these forms are more economic to operate than the conventional fires.

Furthermore, the unit does not require any moving mechanical parts to achieve the appearance of a flickering flame. A single discharge tube can provide light to more than one aperture and hence imitate a number of flickering flames.

The discharge tube may be of the fluorescent type including, for example argon and/or krypton gases; striations occur at somewhat higher current levels when krypton is present.

A suitable colour for the imitation "flames" can be achieved by appropriate selection of the gases in the tube or of any phosphor coating on the tube; additionally or alternatively, the unit may have some form of filtering of the light output to provide suitable colouring.

The tube may be located within the unit to be under and adjacent at least one aperture in the cover to permit direct viewing of part of the tube intermediate the electrodes. Additionally or alternatively, the unit may have means to guide light from part of the tube, intermediate the electrodes and remote from one aperture, to that aperture for viewing; the guiding means may be a light-transmitting rod, or a mirror or an edge-lit transparent sheet with a light-refracting region adjacent at least one aperture.

The simulation unit can be used with any suitable form of gas or electric heater, or it can be used alone for display purpose only.

In order that the invention may more readily be understood, a description is now given, by way of example only, reference being made to the accompanying drawings, in which:

Figure 1 is a front elevation view of a gas fire embodying the present invention; and

Figure 2 is a sectional view along the line II–II of Fig. 1.

The illustrated gas fire 1 is designed to appear to have glowing coals between which flames randomly flicker. Fire 1 has a housing

2, the bottom section of which is formed to look like a cast-iron fire basket. The upper section of housing 2 has a number of radiant heater elements 3 which are heated in use by a burner pipe 4 having a plurality of gas outlet holes along its length; then the elements 3 radiate their heat out into the room. The combustion products are collected at the top of elements 3 and passed through a heat exchanger 5 (only partly shown in the drawings) so that heat, extracted from the combustion products, can be direction into the room.

Housing 2 also accommodates a solid-fuel simulation unit 6 having a fibre glass cover 7 which is shaped and coloured to simulate a pile of coals. The cover 7 has a number of apertures 8, of different sizes and shapes but all intended to represent forms of flames. The majority of the apertures 8 are located in regions of cover 7 which represent the interfaces between two simulated pieces of coal.

A fluorescent tube 9, with a phosphor coating to provide an orange-red light, is positioned diagonally within the unit 6, so as to be underneath and adjacent the cover 7. Moreover tube 9 lies immediately behind a majority of the apertures 8 thereby allowing a person to view it directly at a number of places on the cover 7. For each of the remaining apertures, a rod 10 of light-refractive material extends between a portion of the tube 9 and that aperture in order to transmit light out through that aperture. Rod 10 may have a free end with a cross-section corresponding to the shape of the aperture, in order that the rod end fits snugly within the aperture.

Fluorescent tube 9 contains impurities, inter alia water vapour, which ensures that swirling regions of light intensity occur along the length of tube 9; also the tube has no gettering agents which might reduce the swirling effects. US 4341977 describes a fluorescent lamp wherein a swirling effect is created by including in the lamp fill small amounts of so-called arc-spreading initiations e.g. nitrogen or freon.Moreover, this random movement may be further compounded by striations or bands of light intensity moving between the tube electrodes, these striations being achieved by limiting the current input to levels below that essential for uniform gas discharge. Randomness of movement can be further enhanced by continually varying the actual value of current input to the tube, by means of a variable, series of shunt impedance controller 11 which forms part (or all) of the ballast system. Controller 11 also provides a sufficient starting voltage for the lamp and then a subsequent restriction of the current to a working level at which moving striations and/or swirling occurs.

Additional randomness of the striation effect can be achieved by intermittently applying a small D.C. current, preferably of a varying value. In this way, a known method of preventing striations in lights (namely the application of a small D.C. bias, usually of up to 1 milliamp) is utilized to make the simulation effect more realistic.

Unit 6 also includes a back-reflector 12 positioned to direct some light from tube 9 generally onto the interior of the cover 7 and hence simulate the glow of embers. By providing the back-reflector with a crumpled, irregular reflecting surface instead of a smoothly arcuate one, the movements of the glow is made to be disassociated with that of the flames. The unit can include a low wattage filament lamp if an overall, constant glow is also required.

The simulation unit 6 can be turned on and off independently of the gas burners 4 so that unit 6 can be used for decoration even when no heating is required.

In a modification, the unit 6 has one or more mirrors (whether in addition to, or as an alternative to, rods 10) in order to guide light from one part of the tube 9 to a remote aperture.

In another modification, light is guided to one or more remote apertures by a plastics sheet located so that its edge lies adjacent tube 9. The sheet has one or more regions which direct light (whether by reflection, refraction or scattering) outwardly from the sheet; the sheet is suitable positioned such that a region lies adjacent an aperture in the cover.

In another modification the fluorescent tube is not straight, but has one or more bends so that the apertures can be arranged over a larger portion of the cover without recourse to rods or mirrors. Clearly, this forms of simulation unit can also include rods and/or mirrors to transmit light to some apertures in the region of the cover remaining inaccessible to the tube.

CLAIMS

1. A unit for simulating a solid-fuel fire, the unit comprising a gas discharge tube, means to create, in use, regions of different light intensity moving between the discharge electrodes of the tube and a cover having one or more apertures through which a respective part or respective parts of the tube can be viewed.

2. A unit according to Claim 1 wherein said tube is located to be under, and adjacent, said aperture in the cover so as to permit direct viewing of a respective part of the tube.

3. A unit according to Claim 1 or Claim 2 wherein a said aperture in the cover is remote from said tube and means are provided to guide light to said remote aperture from a respective part of the tube so as to permit indirect viewing thereof.

4. A unit according to Claims 1 to 3 wherein said means to create, in use, regions

of different light intensity comprises means to create swirling regions of light intensity between the electrodes.

5. A unit according to Claim 4 wherein said means to create swirling regions comprises an impurity within the discharge tube.

6. A unit according to any of Claims 1 to 5 wherein said means to create, in use, regions of different light intensity comprises means to create striations of light intensity moving between the electrodes.

7. A unit according to Claim 6 wherein said means to create striations comprises means to control the input current to the tube.

8. A unit according to any one of Claims 1 to 7 including means to reflect light, produced by the tube, towards the cover.

9. A unit for simulating a solid-fuel fire, the unit being substantially as hereinbefore described by reference to and as illustrated in the accompanying drawings.

10. A heater incorporating a unit for simulating a solid-fuel fire according to any one of Claims 1 to 9.

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